#15 Amendment Final 9/24/02

Docket No.: 432.002/10101579
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Dr. Igor A. Krichtafovitch, et al.

Application No.: 09/419,720 Group Art Unit: 2821

Filed: October 14, 1999 Examiner: E. Alemu

For: ELECTROSTATIC FLUID ACCELERATOR

AMENDMENT

Commissioner for Patents
Washington, DC 20231

Dear Sir:

In response to the Office Action mailed June 14, 2002, and as agreed during the telephonic interview conducted September 18, 2002, please amend the above-identified U.S. patent application as follows:

In the Claims

Please amend claims 1, 14, 16, 18, 26, 42, 43, and 45 as follows:

1. (Amended) An electrostatic fluid accelerator comprising:

a multiplicity of closely spaced corona electrodes; and

at least one exciting electrode shaped as a plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located

between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction.

~~14~~. (Amended) An electrostatic fluid accelerator comprising:

a multiplicity of closely spaced corona electrodes;

a least one exciting electrode plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction; and

at least one accelerating electrode located downstream from said corona electrodes with respect to said desired fluid flow direction.

~~16~~. (Amended) The electrostatic fluid accelerator as recited in claim ~~14~~, wherein:

a voltage between said corona electrodes and said exciting electrodes is maintained between a corona onset voltage and a breakdown voltage.

18. (Amended) The electrostatic fluid accelerator as recited in claim ~~17~~, wherein:

a voltage between said corona electrodes and said exciting electrode is controlled by a flexible top high-voltage power supply.

~~26~~. (Amended) The electrostatic fluid accelerator as recited in claim ~~25~~, wherein:

a voltage between said corona electrodes and said exciting electrode is controlled by a flexible top high-voltage power supply.

42. (Twice Amended) An electrostatic fluid accelerator, which comprises:

a corona discharge device including a multiplicity of closely spaced corona electrodes at least one exciting electrode shaped as a plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction;

one or more additional corona discharge devices, each of said additional corona discharge devices being located downstream, with respect to a desired direction of fluid flow, from a preceding corona discharge device; and

at least one collecting electrode located between at least one pair of said corona discharge devices.

43. (Amended) An electrostatic fluid accelerator comprising:

(i) a flexible top high-voltage supply, including:

(a) a base unit that produces a base output voltage which is relatively insensitive to an output current of the power supply,

(b) a second unit that is relatively sensitive to said output current of said power supply whereby an flexible output voltage of said second unit decreases in response to an increase in said output current from the power supply; and

(c) combining circuitry configured to combine said base output voltage from said base unit and said flexible output voltage of said second unit into a common power supply output; and

(ii) an assemblage of electrodes including

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a set of electrodes connected to said common power supply output for producing a corona discharge, said set of electrodes including a multiplicity of closely spaced corona electrodes and at least one exciting electrode shaped as a plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction.

~~45~~ 26. (Amended) The device employing electrodes as recited in claim ~~43~~ 27, wherein:

at least one set of electrodes is located in a separate frame having an opening for free fluid passage.

Please cancel claims 4, 5, 7, 8, 11, 12, 19, 20, 22, 23, 27, 28, 35, 36, 39, 40, and 44 and add new claim 46 as follows:

--~~46~~ 29. (New) The electrostatic fluid accelerator according to claim ~~43~~ 27 wherein:

said base unit comprises a plurality of series connected first capacitors receiving a high frequency power signal at an input of said series connection and providing said base output voltage; and

said second unit comprising a second capacitor connected to receive said high frequency power signal and to provide said flexible output voltage in series with said base voltage provided by said series connected first capacitors, said second capacitor having a capacitance less than a value of capacitance of said first capacitors.--

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REMARKS

The Examiner's help and valuable assistance rendered to advance prosecution of the instant application are acknowledged and gratefully appreciated. Consistent with the agreement made during a telephonic interview conducted September 18, 2002, all independent claims are amended to require *inter alia*, that an exciting electrode be asymmetrically located between corona electrodes with respect to a desired fluid flow direction thereby distinguishing over the art of record and placing the claims in condition for allowance. More specifically, claims 1 and 14 are amended to further describe the geometry and placement of the exciting electrode; claim 42 is worded to incorporate similar features into the first corona discharge device described; and 43 is rewritten by incorporating the subject matter of claim 44 and by further recitation of the asymmetric plurality of corona electrodes. New claim 46 recites specifics of the flexible top high-voltage supply of claim 43. Claims 7, 11, 19, 27, 30, 35, and 39 are cancelled, the subject matter recited therein having been incorporated into the independent claims as detailed above. It is the understanding of the undersigned that the present amendments to the claims are fully consistent with the language agreed to and place the application in condition for allowance.

It is noted that, while the present amendments to the claims are made to advance prosecution, Applicants believe that they are entitled to certain broader claim scope and the present amendments are made without prejudice or waiver to include claims of broader scope and the submission of arguments in appropriately filed continuing applications.

In addressing the outstanding Action, claims 4, 5, 7, 8, 11, 12, 19, 20, 22, 23, 27, 28, 35, 36, 39, 40, and 44 have been canceled and claim 46 has been added, making claims 1-3,

6, 9, 10, 13-18, 21, 24-26, 29-34, 37, 38, 41-43, 45, and 46 pending in the present patent application.

Claims 16, 18 and 26 are objected to because of the following informalities: in claims 16, 18, and 26, according to the Examiner the recitation of the limitation "the voltage" in line 2, makes the claim indefinite, the Examiner taking the position that there is insufficient antecedent basis for this limitation in each claim.

Claims 1-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gourdine (U.S. Patent No. 3,582,694) in view of Torok, et al. (U.S. Patent No. 5,077,500).

In response to the formal objections, claims 16, 18, and 26 are amended to address the informalities identified by the Examiner. In addition, claim 14 is amended to more clearly identify the subject matter of the invention. Finally, new claim 46 is added to provide Applicants a scope of protection commensurate with the disclosure and figures as filed.

The rejection of claim 1-45 under 35 U.S.C. § 103(a) as being unpatentable over Gourdine, U.S. Patent No. 3,582,694 ("Gourdine"), in view of Torok, et al., U.S. Patent No. 5,077,500 ("Torok"), is respectfully traversed. The rejection is believed to be improper both because the pending claims recite subject matter not found in the combination of the references cited by the Examiner and because the combination itself is improper under 35 U.S.C. § 103(a).

Gourdine describes an electrode gas dynamic system using slender gas flow channels to carry electrical charges to a downstream charge collector. Each flow channel has an elongate cross section which may gradually increase from one end of the channel to the other. A corona discharge injects electrical charges into the flow between an attractor and corona discharge electrode. The Gourdine devices operations on a fluid stream which has already

been established to increase a total energy of the fluid stream or to affect precipitation of particulate matter entrained in the fluid stream. In contrast, Torok is directed to an electric ion wind generator. There is simply no motivation to modify the Gourdine device according to any description or teachings contained in the Torok patent absent the application of impermission hindsight gleaned from Applicants' disclosure. Not only are the disclosures directed to different problems, but there is no suggestion found in either for their combination. Further, even if as asserted by the Examiner, certain aspects of the Torok disclosure describe particular advantages such as incorporating a screen electrode to provide a more uniform distribution of corona discharge, there is no reason to believe that such modification would be applicable to or beneficial if incorporated by the Gourdine apparatus.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re* Mills, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." (916 F.2d at 682, 16 U.S.P.Q.2d at 1432.). See also *In re* Fritch, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references).

It is well established that, even if all aspects of the claimed invention were individually known in the art, such is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte* Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). It is, therefore, incumbent upon the Examiner to provide some suggestion of the desirability of doing what the inventor has done in his formulation, imposition and maintenance of a rejection under 35

U.S.C. 103(a). "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte* Clapp, 227 U.S.P.Q. 972, 973 (Bd. Pat. App. & Inter. 1985).

There being no cognizable motivation for making the combination, the rejection under 35 U.S.C. § 103(a) is improper and withdrawal thereof is respectfully requested.

Further even if it were proper to combine the applied references as asserted by the Examiner, the claimed invention would not result. For example, claim 1 requires an "exciting electrode" asymmetrically located between...corona electrodes with respect to [a] desired fluid flow direction..." As fully described in Applicants' disclosure, this asymmetry is an important feature of various embodiments of the invention. The asymmetrical location of at least one of the exciting electrodes provides a non-uniform electric field that is capable of accelerating ions towards or in a desired direction, *i.e.*, in a direction in which the fluid is to be accelerated. Thus, with reference to Figures 1-4, this desired direction is the horizontal flow depicted by the arrows. Such an asymmetrical location of the electrodes relative to each other is nowhere taught in the applied art, either individually or in combination.

While the Examiner refers to Figure 5 together with the text at column 6, lines 12-52 of Torok, it is noted that the written description fails to make any mention of surfaces 5 nor is there description anywhere in the text that any off-center (*i.e.*, asymmetric) location provides a desired result, such as a non-uniform electric field. At most, Figure 5 may only be drafted such that the corona electrode elements K are located slightly offset relative to the center of surfaces 4 and 5. However, any slight offset is not explained and may well be unintentional or merely a convenience for drafting purposes. For example, it is noted that the drawings are

neither to scale nor is the location of corona electrode K depicted with any consistency (or explanation for any inconsistencies) throughout the figures. That is, it is not clear whether corona wires K are or are not centrally located in the center of exciting electrode surfaces 5; there is no description supporting the position taken by the Examiner that such location is asymmetrical. To the contrary, referring to column 5, line 10, Torok explicitly states that "surface 5 [is] arranged centrally between the two center most corona electrode elements K."

While unintended or unexplained features in the drawing may constitute prior art, the drawings must reasonably disclose and suggest such feature to one of ordinary skill in the art (*see*, MPEP § 2125); such as not the case here. In this case, the drawings do not appear to be to scale and cannot be relied upon to define the precise proportions of the elements or their relationships. Without any description supporting an asymmetrical location of the corona electrodes relative to the exciting electrodes, the Figure would not suggest the claimed asymmetry to those who are skilled in the art.

Further, even if an off-center or bias location of corona elements K might be inferred from Figure 5 (which it should not), such as arrangement would not produce any asymmetrical electric fields capable of accelerating ions toward either direction except vertically, *i.e.*, perpendicular to a "designed" direction of fluid flow through the device. Such a vertical acceleration is obviously not in a desired direction of fluid flow. Instead, it is obvious that Torok's goal of providing a "more uniform distribution of the corona" is contrary to production of a non-uniform (*i.e.*, bias) electric field generation of ions and air flow production.

Further, inferring a particular orientation or configuration of corona electrode elements K from Figure 5 so as to provide an asymmetrical orientation is contrary to the spirit of Torok's invention. Torok explicitly describes electrically conductive surfaces for having a

potential selected so that a large potential difference exists between conductive surfaces for a corona electrode K "without any substantial part of the corona current passing to the surfaces (4)." See the abstract of the disclosure. In contrast, the present invention as described in claim 1 is premised on a current (ions) flowing from the corona electrodes to the exciting electrodes (*see* page 13, line 17 and page 14, line 21). It can be seen from Figures 1 and 2 of Applicants' disclosure that the desired fluid flow is shown by the arrow in a horizontal direction, not vertical. Thus, neither Gourdine nor Torok, alone or in combination, describe the subject matter of claim 1, including "at least one exciting electrode asymmetrically located between...corona electrodes." Not only would it be improper to combine the references as asserted by the Examiner, but any interpretation of Torok to include such an asymmetrical positioning of electrodes is based solely on a drawing which is not believed to be drawn to scale and in which any relationship between the components appears to be unintended and is otherwise unexplained. Accordingly, claims 1, and claims 2, 5, 6, 8-10, 12, and 13 dependent therefrom are considered to be distinguishable over the applied references.

Claims 43 and 44 stand rejected as being anticipated over Gourdine as shown in Figures 1 and described in column 5, line 37 - column 6, line 16. This rejection is rendered moot by the present amendment adopting language agreed to as fully distinguishable over the applied art.

In connected with claim 14 and the claims dependent therefrom, the claims as amended require that the exciting electrode be asymmetrically located between the corona electrodes with respect to a desired fluid flow direction. Accordingly, claim 14 and the claims dependent therefrom are considered to be distinguishable over Gourdine and Torok taken alone or in combination for the reasons presented above.

Claim 46 is further considered to be allowable both for the reasons presented above in

that the corona and exciting electrodes are asymmetrically located with respect to one another and as further defining, accelerating a fluid in a desired direction with respect to the asymmetry. The applied art fails to describe or suggest a structure.

For the reasons presented above, all pending claims are now believed to be in condition for allowance. Favorable reconsideration of this application as submitted is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

Dated: 9/23/2002

Respectfully submitted,

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Version With Markings to Show Changes Made

1. (Amended) An electrostatic fluid accelerator [which comprises] comprising:

a multiplicity of closely spaced corona electrodes; and

at least one exciting electrode shaped as a plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes [with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction].

14. (Amended) An electrostatic fluid accelerator[, which comprises] comprising:

a multiplicity of closely spaced corona electrodes;

a least one exciting electrode plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction; and

at least one accelerating electrode located downstream from said corona electrodes with respect to said desired fluid flow direction.

16. (Amended) The electrostatic fluid accelerator as recited in claim 14, wherein:

[the] a voltage between said corona electrodes and said exciting electrodes is maintained between [the] a corona onset voltage and [the] a breakdown voltage.

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18. (Amended) The electrostatic fluid accelerator as recited in claim 17, wherein:

[the] a voltage between said corona electrodes and said exciting electrode is controlled by a flexible top high-voltage power supply.

26. (Amended) The electrostatic fluid accelerator as recited in claim 25, wherein:

[the] a voltage between said corona electrodes and said exciting electrode is controlled by a flexible top high-voltage power supply.

42. (Twice Amended) An electrostatic fluid accelerator, which comprises:

a corona discharge device including a multiplicity of closely spaced corona electrodes at least one exciting electrode shaped as a plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction;

one or more additional corona discharge devices, each of said additional corona discharge devices being located downstream, with respect to a desired direction of fluid flow, from a preceding corona discharge device; and

at least one collecting electrode located between at least one pair of said corona discharge devices.

43. (Amended) An electrostatic fluid accelerator comprising:

(i) a flexible top high-voltage supply, including:

(a) a base unit that produces a base output voltage which is relatively insensitive to an output current of the power supply,

(b) a second unit that is relatively sensitive to said output current of said power supply whereby an flexible output voltage of said second unit decreases in response to an increase in said output current from the power supply; and

(c) combining circuitry configured to combine said base output voltage from said base unit and said flexible output voltage of said second unit into a common power supply output; and

(ii) an assemblage of electrodes including

a set of electrodes connected to said common power supply output for producing a corona discharge, said set of electrodes including a multiplicity of closely spaced corona electrodes and at least one exciting electrode shaped as a plate extending downstream with respect to a desired fluid flow direction, said at least one exciting electrode asymmetrically located between said corona electrodes with respect to said desired fluid flow direction such that a desired fluid flow is generated in said desired fluid flow direction.

45. (Amended) The device employing electrodes as recited in claim [44] 43, wherein:

at least one set of electrodes is located in a separate frame having an opening for free fluid passage.

46. (New) The electrostatic fluid accelerator according to claim 43 wherein:

said base unit comprises a plurality of series connected first capacitors receiving a high frequency power signal at an input of said series connection and providing said base output voltage; and

said second unit comprising a second capacitor connected to receive said high frequency power signal and to provide said flexible output voltage in series with said base voltage provided by said series connected first capacitors, said second capacitor having a capacitance less than a value of capacitance of said first capacitors.

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COMMENTS

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